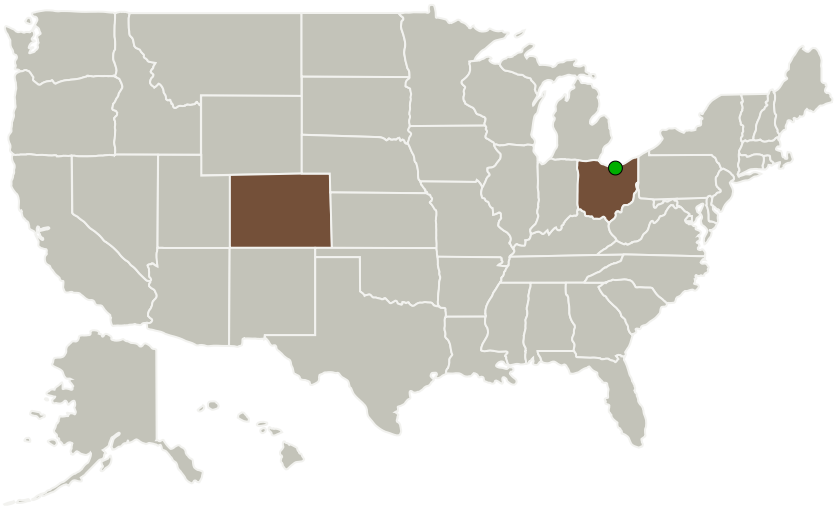
Computer-Controlled Force Generator, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

TDA Research, Inc proposes to develop a compact, low power, high life-cycle computer controlled Programmable Force Generator (PFG) that can generate any force between 0 and 700 lbf during any phase of the exercise motion. The proposed device uses a closed loop control system to maintain the predetermined load throughout the range of motion by controlling an electric motor. The force applied during the eccentric phase is independent of the force applied during the concentric phase; the force applied during the eccentric phase (return stroke) can even exceed the force applied during the pull stroke (concentric phase). The PFG uses regenerative braking to store the braking energy harvested during the pull stroke and applies this energy to provide the motive force during the return stroke. The PFG can be integrated with both the hardware and the software of existing exercise equipment such as the Advanced Resistive Exercise Device (ARED). Since the application of force can be automatically controlled during the entire range of motion, the PFG eliminates the need for the user to adjust the equipment to their specific range of motion; this significantly increases the fraction of time that can be spent exercising relative to the time spent configuring equipment.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
TDA Research, Inc.	Lead Organization	Industry	Wheat Ridge, Colorado
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Colorado	Ohio

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140302)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TDA Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

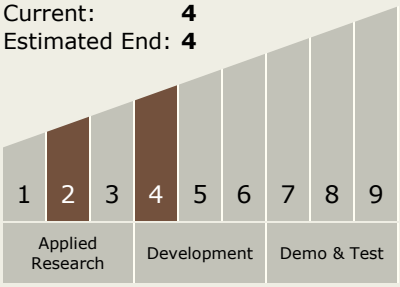
Carlos Torrez

Principal Investigator:

Douwe Bruinsma

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.2 Prevention and Countermeasures

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System